



Best Practices for Road Weather Management

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Weather threatens surface transportation nationwide and impacts roadway mobility, safety, and productivity. There is a perception that transportation managers can do little about weather. However, three types of mitigation measures—control, treatment, and advisory strategies—may be employed in response to environmental threats and impacts. For example, this may include road weather and traffic surveillance to monitor threats to system performance, arterial and freeway management to modify roadway capacity, as well as dissemination of advisory information to influence traveler decisions and driver behavior. These management practices are employed in response to various weather threats including fog, high winds, snow, rain, ice, flooding, tornadoes, hurricanes, and avalanches.

This CD contains case studies of systems and applications employed by traffic managers, emergency managers, and winter maintenance managers to improve roadway operations under inclement weather conditions. Each case study demonstrates the entire information thread, from environmental information to system performance information. This information thread begins with the observation and prediction of weather, road surface, traffic, and other environmental conditions to identify threats to transportation system performance. Based upon credible threat information, managers employ mitigation strategies that improve transportation outcomes. The CD also contains a list of acronyms, online resources, and a listing of road weather publications.

Click here to browse the CD 



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This is a collection of best practice case studies that improve roadway operations under inclement conditions. Each case study includes a general description, system components, system operations, transportation outcome, implementation issues, as well as contact information and references.

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This is a collection of publications related to road weather management. You can view publication titles, abstracts and source information.

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- City of Palo Alto, California Flood Warning System
- City of Aurora, Colorado Maintenance Vehicle Management System
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- City of New York, New York Anti-Icing/Deicing System
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Access restriction	CCTV
Adverse weather	Control strategy
Advisory strategy	Crashes
Anti-icing/Deicing	Decision support
Arterial management	DMS
Avalanche	Driver behavior
Bridge	Dust
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Emergency
management

ESS

Evacuation

Flood warning system

Flooding

Fog

Forecasts

Freeway Management

Gates

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High-profile vehicles

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 - Pavement condition
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Safety
Signal timing
Snow
Speed
Speed Management
Tornado
Traffic control
Traffic management
Traveler information

Treatment strategy
Variable speed limit
Vehicle detection
Vehicle guidance
Visibility
Weather information
Wind
Winter maintenance
Winter storm

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- Advanced Collision Warning System for the Roadview Snowplow Driver Assistance System
- ATIS: What Do ATIS Customers Want?
- AVCS for Maintenance Vehicle Apps.
- Adverse Weather Traffic Signal Timing
- An Assessment of Select Metropolitan Washington Public Safety and Transportation Agencies User Needs
- An Independent Evaluation of the OK-FIRST Decision-Support System
- An Investigation of Incident Frequency, Duration and Lanes Blockage for Determining Traffic Delay
- Analyzing the Effects of Web-Based Traffic Information and Weather Events in the Seattle Puget Sound Region

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- Anti-Icing Success Fuels Expansion of the Program in Idaho
- Applications of Advanced ITS Interfacing That Improves Maintenance Operational Effectiveness and Winter Safety in Rural Areas
- Application of Jetting Technology to Pavement Deicing
- Application of RWIS in the Western U.S.
- Application of ATIS Message Standard
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- Are Simplistic Weather-Related Motorist Warning System "All Wet"?

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- **A Benefit/Cost Analysis of ITS Applications for Winter Maintenance**
- **Benefit/Cost Study of RWIS and Anti-Icing Technologies**
- **Best Practices of Outsourcing Winter Maintenance Services**
- **Closing the Data Gap: Guidelines for Quality ATIS Data**
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- Development of Road Surface Condition Sensor Using Optical Temperature Sensor and Weather Sensor
- Development of Road Temperature Sensing System Using Optical Fiber
- Documentation and Assessment of MN/DOT Gate Operations
- Dynamic Messaging
- Economic Evaluation of Advanced Winter Highway Maintenance Strategies
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Other Resources

This is a listing of web sites that contain information related to road weather management.

Titles (listed alphabetically)

- Effects of Various Deicing Chemicals on Pavement Concrete Deterioration
- Efficacy and Economic Efficiency for Thawing Agents Spray Systems: Final Report
- Enhancements to the Virtual Weather Station Methodology
- Evaluation of a Fixed Anti-Icing Spray Technology (FAST) System
- Evaluation of Caltrans District 10 Automated Warning System: Year Two Progress Report
- Evaluation of Motorists Warning Systems for Fog-Related Incidents in the Tampa Bay Area
- Evaluation of the Foretell Consortium Operational Test: Weather Information for Surface Transportation

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- Evaluation of the Operation and Demonstration Test of Short-Range Weather Forecasting Decision Support Within an Advanced Rural Traveler Information System
- Evaluation of the Seattle Smart Trek Model Deployment Initiative
- Evaluation Report for the Evacuation Travel Demand Forecasting Model: Draft
- Extraction of the Slipperiness Component From Weather and Traffic Data for Winter Maintenance Operations
- Flood Warnings On-Line
- Friction as Tool for Winter Maintenance
- Getting Clear on Fog-Related Crashes in Tampa Bay
- A Guide for Selecting Anti-Icing Chemicals, V 1.0

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- Happy Motoring on Safer Interstate Highway: High-Tech Fog Warning System Developed at Georgia Tech Will Issue Advisories to Motorists
- Highway Deicing: Comparing Salt and Calcium Magnesium Acetate (Special Report: 235)
- Idaho Storm Warning System Op. Test
- Identification and Documentation of Weather and Road Condition Dissemination Devices and Data Formats
- Identification of Trigger Wind Velocities to Cause Vehicle Instability
- Improving Public Response to Hurricane Flooding
- Information on the Planning, Construction and Operation of Chemical Thawing Agent Spraying Installations
- Internet Technology-Based Road Information Systems

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Titles (listed alphabetically)

- Iowa DOT Weather Information System to Support Winter Maintenance Ops.
- ITS Applications for Snow and Ice Control
- ITS Institutional Issues: A Maintenance/Operations Perspective
- Life Cycle Cost-Benefit Model for RWIS
- Loss of Life in the United States Associated with Recent Atlantic Tropical Cyclones
- Management of Roads in Winter Using CCTV Cameras
- Manual of Practice for an Effective Anti-Icing Program: A Guide for Highway Winter Maintenance Personnel
- Measurement of Motorist's Relative Visibility Index (MRVI) Through Video Images

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Titles (listed alphabetically)

- Mobility and Safety Impacts of Winter Storm Events in a Freeway Environment: Final Report
- Modifying Signal Timing During Inclement Weather
- Multi-Functional Deployment of AHS Key Technology
- National Review of Hurricane Evacuation Plans and Policies: A Comparison and Contrast of State Practices: Draft
- Operator Interface Design of a Lane Awareness System for Snow Removal Operations
- Optimal Control of Variable Speed Limits and Road Lighting Based on Predicted Short Term Socio-Economic Impacts
- Percostation for Real Time Monitoring Moisture Variations, Frost Depth and Spring Thaw Weakening
- A Portable Method to Determine Chloride Concentration on Roadway Pavements

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Titles (listed alphabetically)

- Prediction of Daily Temperature Profile in Flexible Pavements
- Proceedings for the Weather Information for Surface Transportation: Delivering Improved Safety and Efficiency for Tomorrow
- Proceedings of the Workshop on Strategy for Providing Atmospheric Information
- Real Time Forecasting of Hurricane Winds and Flooding
- Remote Sensing and Emergency Management for Coastal Environmental Disasters
- Remote Sensing for Transportation: Report of a Conference
- Reunion Island's Merlin Project: An ITS Implementation Success Story
- Review of the Institutional Issues Relating to RWIS: Final Report

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Titles (listed alphabetically)

- **RWIS: Enabling Proactive Maintenance Practices in Washington State**
- **RWIS: Some Findings on How RWIS Information Should be Disseminated**
- **Road Weather Requirements: Exec. Sum.**
- **Rural Freeway Management During Snow Events—ITS Application**
- **Rural ITS Applications for Snow Maint. and Winter Hazard Mitigation**
- **Signs of Rain**
- **Snow & Ice Control Operations**
- **Snow Emergency Vehicle Routing with Route Continuity Constraints**
- **Socioeconomic Impacts of Heavy Precipitation in the United States**

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Titles (listed alphabetically)

- Southeast United States Hurricane Evacuation Traffic Study
- State of the Practice and Review of the Literature: Survey of Fog Countermeasures Planned Or in Use by Other States
- Surface Transportation Weather Apps.
- Surface Transportation Weather Decision Support Requirements
- Synthesis of Road Weather Forecasting
- System Monitors Flood-Prone Creeks
- Temperature and Humidity Effects on the Co-Efficient of Friction Value After Application of Liquid Anti-Icing Chemicals
- Testing the Adverse Visibility Information System Evaluation (ADVISE)—Safer Driving in Fog

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Titles (listed alphabetically)

- The Advanced Transportation Weather Information System (ATWIS)
- The Effect of Variable Message Signs on the Relationships Between Mean Speeds and Speed Derivations
- The Effect of Weather on Free Flow Speed
- The Measurement and Theory of Tire Friction on Contaminated Surfaces
- The Use of Abrasives in Winter Maintenance: Final Report of Project TR 434
- The Use of Mobile Video Data Collection Equipment to Investigate Winter Weather Vehicle Speeds
- Traffic Modeling Framework for Hurricane Evacuation
- TRAVELAID
- Use of Expert Systems for Roadway Weather Maintenance Decisions

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- Use of Pavement Temperature Measurements for Winter Maintenance Decisions
- Variable Speed Control: Technologies and Practice
- Video Cameras Focus on Visibility
- Vision and Challenges of Integrating Traffic Management and Emergency Response Systems
- Weather Based Traffic Management Applications in Nevada
- Weather in the Info-Structure
- Weather Information for Surface Transportation (WIST I): Establishing the National Needs and Requirements
- Weather Information for Surface Transportation (WIST II): Establishing the National Needs and Requirements
- Weather: A Research Agenda for Surface Transportation Operations

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Titles (listed alphabetically)

- **Weather: Making it a National Priority in Surface Transportation**
- **White Paper: An Integrated Network of Transportation Information**
- **Winter Maintenance in Thompson Falls (Memorandum)**
- **Winter Operations Weather Forecasts: Do They Work for the Maintenance Shed Supervisor?**
- **Winter Storm Event Volume Impact Analysis Using Multiple Source Archived Monitoring Data**



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■ Search (by keyword)

- A-D Keyword
- E-I Keyword
- J-R Keyword
- S-Z Keyword
- Custom Keyword



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■ A-D Keyword

Access restriction	Capacity
Adverse weather	Chemicals
Air temperature	CCTV
Anti-icing/deicing	Communications
Arterial management	Costs
Avalanche	Crashes
Benefits	Decision Support
Benefit/Cost	DMS
Bridge	Driver behavior

■ E-I Keyword

■ J-R Keyword

■ S-Z Keyword

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■ A-D Keyword

■ E-I Keyword

Emergency mgmt.
Environment
ESS
Evacuation
Flood warning sys.
Flooding
Fog
Forecasts

Freeway mgmt.
Gates
Humidity
Hurricane
Incidents
Institutional issues
Internet/Web site

■ J-R Keyword

■ S-Z Keyword

■ Custom Keyword



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■ A-D Keyword

■ E-I Keyword

■ J-R Keyword

Landslide

Law enforcement

Lighting

Maintenance veh.

Mobile sensing

Mobility

Motorist warning sys.

Pavement condition

Pavement friction

Pavement temp.

Precipitation

Productivity

Rain

RWIS

Route choice

■ S-Z Keyword

■ Custom Keyword



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■ A-D Keyword

■ E-I Keyword

■ J-R Keyword

■ S-Z Keyword

Safety

Signal timing

Snow

Speed

Thermal mapping

Traffic control

Traffic mgmt.

Traffic modeling

Traveler information

Variable speed limit

Vehicle detection

Vehicle guidance

Visibility

Volume

Weather information

Wind

Winter maintenance

Winter storm

■ Custom Keyword



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Other Resources *(print entire list)*

This is a listing of web sites that contain information related to road weather management.

- FHWA Road Weather Management Program
- Maintenance Decision Support System (MDSS)
- ITS Resource Guide
- ITS America
- Aurora Program
- Enterprise Program
- Evacuation Traffic Information System (ETIS)
- Snow and Ice Cooperative Program (SICOP)
- Cooperative Program for Operational Meteorology, Education and Training (COMET)
- Office of the Federal Coordinator for Meteorology (OFCM)
- American Meteorological Society (AMS)
- National Weather Service (NWS)
- National Weather Service Tropical Prediction Center, National Hurricane Center
- World Road Association (PIARC)
- Standing International Road Weather Commission (SIRWEC)



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AFWS	Automated Flood Warning System	DSS	Decision Support System
AASHTO	American Association of State Highway and Transportation Officials	EOC	Emergency Operations Center
ATIS	Advanced Traveler Information System	ESS	Environmental Sensor Station
ATMS	Advanced Traffic Management System	FHWA	Federal Highway Administration
AVCS	Advanced Vehicle Control System	GPS	Global Positioning System
B/C	Benefit/Cost	HAR	Highway Advisory Radio
BMP	Best Management Practice	HAZMAT	Hazardous Material
CCTV	Closed Circuit Television	ISP	Information Service Provider
CDPD	Cellular Digital Packet Data	ITS	Intelligent Transportation System
CMAQ	Congestion Mitigation and Air Quality	MMDI	Metropolitan Model Deployment Initiative
DMS	Dynamic Message Sign	NCHRP	National Cooperative Highway Research Program
DOT	Department of Transportation	NWS	National Weather Service
DPS	Department of Public Safety	OFCM	Office of the Federal Coordinator for Meteorology
DSL	Digital Subscriber Line	OK-FIRST	Oklahoma's First-response Information Resource System using Telecommunications

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OLETS	Oklahoma Law Enforcement Telecommunications System	US	United States
PC	Personal Computer	USDOT	United States Department of Transportation
PVC	Polyvinyl Chloride	UTCS	Uniform Traffic Control System
RPU	Remote Processing Unit	VHF	Very High Frequency
RWIS	Road Weather Information System	VSL	Variable Speed Limit
SCADA	Supervisory Control And Data Acquisition	WAN	Wide Area Network
SHEP	State Highway Emergency Patrol		
STC	Smart Traffic Counter		
TCC	Traffic Control Center		
TOC	Traffic Operations Center		
TMC	Traffic Management Center		
TRIS	Transportation Research Information Services		
UHF	Ultra-High Frequency		

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The Best Practices for Road Weather Management CD, released in August 2002, contains resources to help traffic, emergency and maintenance managers learn how to mitigate the impact of weather threats on roadways. The CD contains:

- Case studies employed in response to various weather threats including fog, high winds, snow, rain, ice, flooding, tornadoes, hurricanes, and avalanches;
- Listing of road weather publications;
- Acronyms list; and
- Online resources.

For Additional Information

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- lynette.goodwin@mitretek.org

Road Weather Management program: www.ops.fhwa.dot.gov/weather

ITS Joint Program Office: www.its.dot.gov

Office of Transportation Operations: <http://www.ops.fhwa.dot.gov/Traffic/>

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